



Assessment of Biogeochemical Soil Variability using a Geo-statistical Approach: A Case Study in the Steppe Crimea

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Abstract: Soil monitoring within the lands of steppe zone (first few centuries) being currently under development makes it impossible to identify the effects of agrogenic evolution symptoms for material composition of the soils. Therefore, the areas with centuries-long agriculture are of great research interest, which include steppe soils at the northern Black Sea coast in the ancient period of Greek colonization of land. The present study aimed to develop an approach to simulation of the spatial variability of soil quality (SQ) using geo-statistical modeling. The raster models of continuous distribution of soil quality parameters, which have been developed using modules Spatial Analyst, and Geo-statistical Analyst have established soils qualitative differences with due account for the length of their treatment, source of potential nutrients for plants and specificity of parent rocks. We have fixed the land boundaries, which differ in farming duration using different ensembles of chemical elements with the same procedures geo-statistical analysis of the spatial variability of three types of indicators of the soil quality. A methodical approach to the identification of agricultural areas with different duration and biogeochemical transformation of soils, which the authors have proposed in this article, uses objective geo-statistical analysis procedures and has the ability to analyse in-depth patterns previously unavailable in research. This makes it possible to recommend this approach for use in the interpretation of soil-ecological monitoring data in ancient land areas with complex soil cover and history of land use.

Keywords: Soil ecology, Biogeochemistry, Soil quality, Long-term agriculture, Geo-statistical modeling
